

Remarks

Reconsideration is requested in view of the above amendments and the following remarks. The title is amended to be more descriptive of the pending claims. Claims 22 and 23 are amended for formal reasons. As the amendments to claims 22 and 23 are not made to overcome art, Applicants respectfully submit that they should not be interpreted in a limiting fashion. Claim 24 is added to recite that the terminal electrode is rectangular, with the region to be contacted by the needle being an extension of a square that receives that metal ball. This is supported by the disclosure, for example as shown in Figures 5A and 5B, and as described at page 17, lines 9-17. No new matter has been added. Claims 22-24 are pending in the application.

In the Office Action, the title is objected to as not being descriptive of the invention. Applicants respectfully traverse the objection. The title is amended herein to "Semiconductor Device". Applicants believe the title as-amended is descriptive of the invention. If this title is not deemed suitable, the Examiner is invited to offer suggestions.

Claims 22 and 23 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. In particular, the rejection asserts that claims 22 and 23 lack proper antecedent basis for the terms "said terminal electrode" and "the element", respectively. Applicants respectfully traverse the rejection.

Claims 22 and 23 are amended herein to avoid lack of antecedent basis. Applicants believe the amendments overcome the rejection. Reconsideration and withdrawal of the rejection is respectfully requested.

Claim 22 is rejected under 35 U.S.C. § 103(a) as being obvious from Mitsubishi (JP 63-186448). Applicants respectfully traverse the rejection. A partial translation of the reference is provided for the Examiner's convenience.

The rejection characterizes Mitsubishi as disclosing a region for a probe needle. Applicants respectfully traverse this characterization.

With regard to claim 22, the rejection interprets the portion of Mitsubishi that is not covered by the ball 16 as being a region for a probe needle. However, Applicants respectfully submit that Mitsubishi does not positively disclose or suggest that the area alleged to be such a region is adapted to be contacted by a probe needle. Applicant also finds no suggestion that any other region of the device of Mitsubishi is or even advantageously might be adapted to be contacted by a probe needle.

Applicants respectfully point out that, as probe needles are physical objects, not every open space is necessarily suitable for accepting contact. In particular, Applicants note that a minimum size sufficient to accept the tip of the probe needle is necessary. Conventional probe needles, for example, are on the order of several tens of μm across at their tips. It will be appreciated that areas smaller than this size would be unsuitable for receiving the tip of a probe needle for at least the reason that it physically would not fit.

Thus, Applicants respectfully submit that the limitation in claim 22 of "a region adapted to be contacted by a probe needle for inspection brought into contact therewith" is a functional description of a definite structure, not merely a recitation that some free space of indefinite sized and configuration may be present.

Even if the area surrounding the ball 16 of Mitsubishi is open as characterized by the rejection, which point Applicants do not concede, Mitsubishi does not positively disclose or suggest that the "open" region is suitable to be contacted by a probe needle.

In fact, when the reference is considered as a whole, Mitsubishi actually teaches away from a region adapted to be contacted by a probe needle. Applicants reference the translated portions of Mitsubishi, submitted herewith.

As noted in the translation, in the section beginning at page 1, line 3 from the bottom of the lower right column, Mitsubishi discloses that when a metal ball 6 is compression-bonded to a quadrilateral surface, a portion "b" is left in addition to the portion to which the ball is bonded. This portion is considered "unnecessary", i.e. it is wasted space.

As noted in the section beginning at page 3, line 9 from the bottom of the lower left column, in the invention of Mitsubishi the metal ball may be bonded to a polygonal surface. Because the angles of such a polygon are larger than those of a rectangle, the ball fills a polygon more efficiently than a rectangle. Thus, the wasted space, i.e. the exposed portion left over after the ball is bonded, may be reduced.

As may be seen from these translated portions, it is the purpose of Mitsubishi to reduce the amount of space that is left after a metal ball is bonded to an electrode. This space is considered unnecessary, and is treated as something to be minimized and avoided. This is directly contrary to the principles of the claimed invention, wherein a region not covered by the ball is deliberately produced and serves a useful function, namely, it is a contact area for a probe needle.

Applicants respectfully submit that even if Mitsubishi "could" be modified to provide a region adapted to be contacted by a probe needle, which point Applicants do not concede, it would not be obvious to modify Mitsubishi in a way that is contrary to the disclosure of Mitsubishi.

As the claimed invention according to claim 22 comprises elements neither disclosed nor suggested by Mitsubishi, and as Mitsubishi teaches away from limitations recited in claim 22, Applicants respectfully submit that claim 22 is not obvious from Mitsubishi.

Claim 23 depends from claim 22, and incorporates the limitations therof. The above arguments made with regard to claim 22 apply equally to claim 23. Applicants respectfully submit that separate arguments need not be presented in support of claim 23 at this time.

S/N 09/842,487

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Applicants do not concede the correctness of the rejection with respect to these dependent claims, and reserve the right to present further arguments.

As all matters raised in the Office Action are now addressed, Applicants respectfully request favorable reconsideration in the form of a Notice of Allowance.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's primary attorney-of-record, Douglas P. Mueller (Reg. No 30,300) at (612) 371-5237.

Respectfully submitted,

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Applicant:

ONO ET AL

Examiner:

J. MITCHELL

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Title:

SEMICONDUCTOR DEVICE

(PREVIOUSLY: "MANUFACTURING METHOD FOR SEMICONDUCTOR DEVICE, MOUNTING METHOD OF SEMICONDUCTOR DEVICE, SEMICONDUCTOR DEVICE, AND INSPECTING METHOD OF SEMICONDUCTOR DEVICE")

Amended Claims Marked To Show Changes

22. (amended) A semiconductor device manufactured by a wire bonding method using a metal wire, comprising a region [with which] adapted to be contacted by a probe needle for inspection [is] brought into contact [in addition to] therewith, and a region in which [the] a metal ball formed at [the] a tip of said metal wire by electric discharge is bonded to [said] a terminal electrode formed on the semiconductor device.

23. (amended) The semiconductor device according to claim 22, wherein said terminal electrode is formed on [the] an element or [the] wiring inside said semiconductor device.